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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte VINCENT M. CALLAGHAN,
ROGER R. LESIEUR, and PAUL R. MARGIOTT

Appeal 2010-003422
Application 09/837,503
Technology Center 1700

Before PETER F. KRATZ, MARK NAGUMO, and
MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

DECISION ON APPEAL¹

¹ The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, or for filing a request for rehearing, as recited in 37 C.F.R. § 41.52, begins to run from the “MAIL DATE” (paper delivery mode) or the “NOTIFICATION DATE” (electronic delivery mode) shown on the PTOL-90A cover letter attached to this decision.

Appellants appeal under 35 U.S.C. § 134 the final rejection of claims 2, 5-11, 17, and 18. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

We AFFIRM.

Appellants describe a fuel cell system for controlling the temperature of gas streams in a fuel cell power plant (Spec. 2).

Claims 6 and 18 are illustrative:

6. A fuel cell system, comprising:

a fuel processor for converting a hydrocarbon fuel into a high temperature reformed gas containing hydrogen, carbon dioxide and carbon monoxide,

first conduit means for communicating the reformed gas to a shift converter located downstream of the fuel processor for further converting the reformed gas to primarily a hydrogen and carbon dioxide containing gas stream,

second conduit means for communicating the gas stream to a fuel cell downstream of the shift converter for reacting the hydrogen in the gas stream,

a source of liquid phase water, and

water feed means for feeding liquid phase water from the source to the first and second conduit means in a controlled manner for cooling the reformed gas and gas stream, respectively, to a desired temperature, wherein the water added to the reformed gas sets the desired oxygen/carbon ratio for the shift converter, and further including at least one selective oxidizer, between the shift converter and the fuel cell, and located downstream of where the water feed means feeds water to the second conduit means.

18. A fuel cell system, comprising:

a fuel processor for converting a hydrocarbon fuel into a high temperature reformed gas containing hydrogen, carbon dioxide and carbon monoxide;

a shift converter located downstream of the fuel processor for further converting the reformed gas to primarily a hydrogen and carbon dioxide containing gas stream,

a fuel cell downstream of the shift converter for reacting the hydrogen in the gas stream,

a first conduit connecting the fuel processor to the shift converter for carrying the reformed gas to the shift converter;

a second conduit connecting the shift converter with the fuel cell for carrying the gas stream to the fuel cell;

a source of liquid phase water; and

a water feed control unit for feeding liquid phase water in a controlled manner from the source to at least one of the first and second conduits for cooling at least one of the reformed gas and gas stream, respectively, to a desired temperature, wherein the water feed control unit includes a sensor for sensing temperature of the at least one of the reformed gas and gas stream, a valve for adjusting the flow rate of water into the at least one of the reformed gas and the gas stream, and a control unit for controlling the valve based upon temperature sensed by the sensor, and whereby evaporation of the liquid phase water cools the at least one of the reformed gas and the gas stream.

Appellants seek review of the following rejections:

1. Claim 6 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Wang (US Patent 6,458,478 B1 issued Oct. 1, 2002) in view of Fanciullo (US Patent 4,046,956 issued Sept. 6, 1977).

2. Claims 18, 2, 5, 7, and 11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Takeu (JP 62-283567 published Dec. 9, 1987 as translated) in view of Hirota (JP 59-213940 published Dec. 3, 1984 abstract) and Giles (US Patent 4,264,566 issued Apr. 28, 1981).
3. Claims 6 and 17 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Takeu in view of Hirota, Giles, and Fanciullo.
4. Claims 8-10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Takeu in view of Hirota, Giles, and Fleischli (US Patent 5,380,088 issued Jan. 10, 1995).

We adopt the Examiner's determination of which claim features invoke 35 U.S.C. § 112, paragraph six, and her construction of the means-plus-function language in claims 6 and 8 (Ans. & Supp. Ans. 2-3).

REJECTION (1)

DISPOSITIVE ISSUE

Did the Examiner reversibly err in determining that it would have been obvious to position a selective oxidizer as taught by Fanciullo between Wang's shift converters and fuel cell and downstream of where water is injected into the conduit immediately preceding Wang's second shift converter so as to meet the selective oxidizer requirement of claim 6? We decide this issue in the negative.

FACTUAL FINDINGS (FF) & ANALYSIS

The Examiner finds that Wang teaches the invention of claim 6 with the exception of a selective oxidizer positioned as claimed (Supp. Ans. 5-6).

The Examiner finds that Fanciullo teaches placing a selective oxidizer after a shift converter is conventional in the art (Supp. Ans. 6). The Examiner explains that a selective oxidizer is placed downstream of shift converters in a fuel cell system to decrease further the carbon monoxide content of reformed gas to a tolerable level as instructed by Fanciullo (Supp. Ans. 6-7). The Examiner finds that Fanciullo explains that carbon monoxide poisons the fuel cell and should be minimized to promote long fuel cell life (Supp. Ans. 7).

Appellants argue that it is not clear what teaching in Fanciullo or Wang the Examiner is relying on to position the selective oxidizer downstream from both of Wang's shift converters (App. Br. 10). Appellants contend that it would not have been obvious to place Fanciullo's oxidizer in Wang's fuel cell system at the claimed location because neither reference teaches the stated purpose or reason for the selective oxidizer position as taught by Appellants: reducing any remaining carbon monoxide prior to feeding the reformed gas to the fuel cell (App. Br. 10-11).

However, as noted above, the Examiner plainly states the teachings and reasons for including Fanciullo's selective oxidizer in the claimed location (i.e., after the shift converters and downstream of the water injection in the second conduit) in Wang's fuel cell system. Appellants have not specifically addressed these reasons or teachings of the prior art.

Furthermore, contrary to Appellants' argument, Fanciullo plainly teaches that positioning a selective oxidizer after a shift converter reduces the carbon monoxide content of the reformed gas stream to prevent poisoning the fuel cell (Supp. Ans. 7). Though not required, this reason

happens to be the same reason for Appellants' use and positioning of a selective oxidizer.

Accordingly, we agree with the Examiner that the teachings of Wang and Fanciullo would have suggested placing the selective oxidizer after Wang's shift converters, which would also be downstream of where the water is fed into the second conduit (Supp. Ans. 6).

For the above reasons, we affirm the § 103 rejection of claim 6 over Wang in view of Fanciullo.

REJECTION (2)

Appellants argue the claims as a group from which we select claim 18 as representative (App. Br. 11-12; Reply Br. 1-3).

ISSUES

1. Did the Examiner reversibly err in determining that the subject matter of claim 18 that includes using liquid water would have been obvious over the combined teachings of Hirota and Takeu? We decide this issue in the negative.
2. Did the Examiner reversibly err in determining that Giles is directed to solving the same problem as Appellants and thus is analogous art that one of ordinary skill would have looked to for a control unit to regulate Takeu's supply of water? We decide this issue in the negative.

FINDINGS OF FACT AND ANALYSIS

The Examiner finds that Takeu teaches all that is recited in claim 18, except the use of liquid water and the water feed control unit (Supp. Ans. 7-

9). The Examiner relies on Hirota's teaching to feed liquid water to a conduit 20b between fuel processor 1d and shift converter 24 as establishing that using liquid water in lieu of steam would have been conventional in the art and serve the same function (Supp. Ans. 8). The Examiner relies on Giles as teaching a control system that senses temperature and manipulates valves that feed gas to the catalyst beds in response thereto (Supp. Ans. 8-9). The Examiner reasons that using Giles' control system in Takeu's fuel cell system to control the water would have been obvious in order to permit a close control of the temperature within the apparatus, with minimal measurement time lag as taught by Giles (Supp. Ans. 9).

Issue (1)

Appellants argue that the use of liquid water is critically different than the use of steam as in Takeu and produces surprising results (App. Br. 11). Appellants contend that the teaching of liquid water in other prior art patents which have been used as secondary prior art should not be seen as evidence that a person skilled in the art would make such a modification (App. Br. 11; Reply Br.² 1-2).

However, Appellants' conclusory statement regarding how the secondary references (i.e., Hirota) should be viewed with regard to obviousness does not specifically address the Examiner's position or reasoning regarding why the use of liquid water would have been obvious in view of Hirota's teachings (Supp. Ans. 8). Moreover, Appellants provide no evidence to substantiate the "surprising" results allegedly obtained by using liquid water. We are not persuaded.

² Preliminary Reply Brief filed July 6, 2009.

Issue (2)

Appellants argue that Giles merely demonstrates that control systems based upon temperature measurements exist in other and very different fields of endeavor (Reply Br. 2; Supp. Reply Br.³ 1). Appellants contend that Giles is from a different field of endeavor and is directed to a different problem to be solved than Takeu or the claimed invention (Reply Br. 2-3; Supp. Reply Br. 1). Appellants argue that Giles' control prevents temperature oscillations in the reactor, which is completely different than and unrelated to the cooling function of the present invention where a reactant stream is cooled for the downstream fuel cell component (Supp. Reply Br. 1). Appellants contend that there is no reasonable expectation that using Giles' control system in Takeu would have been successful (Reply Br. 3).

The Examiner provides a well-reasoned analysis that both Takeu and Giles are directed to the problem which concerned Appellants: controlling temperatures in a series of catalyst beds (Supp. Ans. 17). We agree with the Examiner that Giles controlled addition of cooler feed to the conduits leading to the reactor to thereby control the temperature therein is directed to substantially the same problem as Takeu and Appellants (Supp. Ans. 17). We agree with the Examiner and find that Giles is analogous art.

Appellants have not explained why using Giles' valve control system in Takeu's fuel cell system would not have reasonably been expected to be successful. As already established Giles and Takeu address the same problem as Appellants and it appears to us that using Giles' control system

³ Supplemental Reply Brief filed December 15, 2009 in response the Supplemental Examiner's Answer.

to manipulate the valves to supply water in response to the temperature sensed in the conduits of Takeu would have been successful. We agree with the Examiner that using Giles' temperature responsive control system in Takeu's fuel cell system appears to be nothing more than the predictable use of a prior art element according to its established function (i.e., controlling valves for supplying gas or liquids) (Supp. Ans. 18).

For the above reasons, we affirm the § 103 rejection of claims 18, 2, 5, 7, and 11 over Takeu in view of Hirota and Giles.

REJECTION (3)

Appellants advance no additional arguments regarding rejection (3), instead relying on their unpersuasive arguments made with respect to rejection (1). Of course, the unpersuasive arguments made with respect to rejection (2) are likewise unpersuasive to the extent they apply to claim 17, as a result of its dependency on claim 18.

For the above reasons, we affirm the § 103 rejection of claims 6 and 17 over Takeu in view of Hirota, Giles, and Fanciullo.

REJECTION (4)

ISSUE

Did the Examiner reversibly err in determining that one of ordinary skill in the art would have used Fleischli's nozzle assembly in the modified apparatus of Takeu? We decide this issue in the negative.

FINDINGS OF FACT AND ANALYSIS

Appellants argue that nothing in the art of record would have lead a person of skill in the art to combine Fleischli's atomizing nozzle into the water feed zone of the present claims (App. Br. 12-13; Reply Br. 3).

Appellants' argument, however, fails to address the Examiner's reason for making the modification. The Examiner reasons that one of ordinary skill in the art would have combined the mixing device of Fleischli in the modified apparatus of Takeu in order to provide "intimate mixing over the entire cross section of a channel, and over short sections, while maintaining a small pressure drop" as taught by Fleischli (Supp. Ans. 11). We agree with the Examiner's well-reasoned analysis.

For the above reasons, we affirm the § 103 rejection of claims 8-10 over Takeu in view of Hirota, Giles, and Fleischli.

DECISION

The Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1).

ORDER

AFFIRMED

bar

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